



UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
-----------------	-------------	----------------------	---------------------	------------------

10/534,877

05/12/2005

Armin Schwerdtner

356907.00002-US

6555

78905

7590

02/23/2010

Saul Ewing LLP (Philadelphia)

Attn: Patent Docket Clerk

2 North Second St.

Harrisburg, PA 17101

EXAMINER

CHANG, AUDREY Y

ART UNIT

PAPER NUMBER

2872

MAIL DATE

DELIVERY MODE

02/23/2010

PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No. 10/534,877	Applicant(s) SCHWERDTNER, ARMIN	
	Examiner Audrey Y. Chang	Art Unit 2872	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 10 December 2009.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 11-16, 18-23, 25, 26, 28, 29, 31-48, 51-54, 56, 57, 59 and 61-64 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-16, 18-23, 25, 26, 28, 29, 31-48, 51-54, 56, 57, 59 and 61-64 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
- ☐ Certified copies of the priority documents have been received.
 - ☐ Certified copies of the priority documents have been received in Application No. _____.
 - ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413) |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | Paper No(s)/Mail Date. _____ |
| 3) <input checked="" type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08) | 5) <input type="checkbox"/> Notice of Informal Patent Application |
| Paper No(s)/Mail Date <u>9/16/2009</u> . | 6) <input type="checkbox"/> Other: _____ |

DETAILED ACTION

Remark

- This Office Action is in response to applicant's amendment filed on December 10, 2009, which has been entered into the file.
- By this amendment, the applicant has amended claims 11, and 41.
- Claims 11-16, 18-23, 25-26, 28-29, 31-48, 51-54, 56-57, 59, and 61-64 remain pending in this application.

Claim Rejections - 35 USC § 103

1. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

2. **Claims 11-16, 18-23, 25, 26, 28, 29, 31-48, 51-54, 56, 57, 59 and 61-64 are rejected under 35 U.S.C. 103(a) as being unpatentable over the patent issued to Cameron et al (PN. 7,230,746) in view of the patent issued to Klug et al (PN. 6,665,100).**

Claims 1 and 41 have been amended to necessitate the new grounds of rejection.

Cameron et al teaches a 3D image display utilizing computer generated hologram wherein the 3D image display is comprised of a *computer generated hologram* (CGH) stored in a hologram bearing medium (Figure 6b), a *Fourier transform lens* (3) and implicitly includes a *light source* for illuminating the CGH to generate the diffracted light for reconstructing the 3D image for viewing. It is implicitly true, *with regard to the amendment*, that the Fourier lens would create an image plane for the light source and would *image* the light source into the image plane of the light source. The image plane that the light source is being imaged to should be the focal plane of the optical system. **Cameron** et al teaches that the computer generated hologram is calculated based on a point in the three dimensional object (**point 14**,

Art Unit: 2872

Figure 6b) to be reconstructed. The wave propagated from the hogel (8) focused at point (14) and reaches the eye pupil of the observer, which serves as the viewing window. The image viewed by the observer at the viewing window by inverse Fourier transformation. Form the viewing window extended by the eye pupil of the observer, one can trace a pyramid from the edges of the observer window through the point (14) onto a region forms only a portion of the hologram bearing medium or a hogel, as shown in Figure 6b. The hogel (8) is then the computer-calculated and encoded hologram for reconstructing the point of the object. Cameron et al teaches that the hologram bearing medium is comprised of a plurality of hogels that serves as the sequence of the holograms. As demonstrated by Figure 6b, the single hogel (8) that serves as the region is encoded with information for reconstructing the point and is only region in the CGH that is encoded with the information for reconstructing that point. The size of the hogel limits the diffraction order of the light can be seen. Cameron et al teaches that the hologram recording medium is comprised of a plurality of hogels that serves as the matrix of cells. The diffraction of the light by region of the hologram recording medium equivalent to the hogel will be transformed to the viewing window and implicitly defines the size of the viewing window according to the diffraction order.

Although this reference does not teach explicitly that the viewing window is no larger than a single order of the light diffracted by the hogel of the recording medium and the reconstructed hologram from the hogel is limited to the single diffraction order such is either implicitly included by the size of the hogel or an obvious modification to one skilled in the art to eliminate the possible of overlapping of different diffraction orders. The hologram reconstruction of the three dimensional object is within a reconstruction frustum between the hologram bearing medium and the viewing window, (please see Figure 6(b)).

Claims 1 and 41 have been amended to include the phrase that “the optical system image the light source into an image plane of the light source” and then the viewing window is provide in the image plane of the light source. Cameron et al does not teach such *explicitly*. But it does teach that the

Art Unit: 2872

hologram can be reconstructed via the optical system at the focal point of the optical system as shown in Figure 1. **Klug** et al in the same field of endeavor teaches an autostereoscopic three dimensional display using holographic projection wherein the viewing *zones* are formed at the *focal plane* or the image plane of the light source as shown in Figures 1-13. It would then have been obvious if not already the case to make the viewing zones at the focal plane or the image plane of the light source for the benefit of allowing the reconstructed holographic image to be viewed at the image plane of the light source.

It also does not teach explicitly to include a sequence of the hologram for forming a video hologram. However such modification would have been obvious to one skilled in the art for the benefit of extending the application of the computer generated hologram to display video image.

With regard to claims 12 and 51-52, it is implicitly true that the viewing window is positioned in relating to the eye of the observer, since hologram is direction selective, placing eye outside the viewing direction determined by the encoded hologram will not be able to view the reconstructed hologram.

With regard to claims 13-14, it is implicitly true that the holographic reconstruction is made up of multiple discrete points and each of the point is related to the region of the spatial light modulator encoded with information for reconstructing that point.

With regard to claim 15, Cameron et al teaches that the hologram is computer generated which means a computer processor is included. Although it does not teach explicitly to generate for left and right eye sequentially, such can be achieved since it is really a repetition of calculation steps for different eyes.

With regard to claim 16, the hologram reconstruction representing the three dimensional scene at the observer viewing window is described by *inverse* Fourier transformation. This reference however does not teach explicitly that the holographic reconstruction representing the three dimensional scene is described by the Fresnel transformation of the hologram being coded in the medium. But since it has

Art Unit: 2872

similar arrangement of the instant application, it would satisfy the claim the same way as the instant application.

With regard to claims 18-21, it is implicitly true that the size of the viewing window that depends on the diffraction of light from the hogel is depends on the size of the hogel. The actual size of the viewing window is considered to be obvious matters of design choice to one skilled in the art.

With regard to claims 22, 31, 42 and 53, this reference does not teach to tracking the eye of an observer, however eye tracking sensor is well known in the art for detecting the eye position of an observer for allowing the light illumination and therefore the display of an image be accommodate with the movement of the observer.

With regard to claims 23, 25, 26, 28, 29, 54, 56, 57 and 59, Cameron et al does not teach explicitly that the light source may include individual real or virtual point light source, line light source, and a plurality of point light sources. But it is known in the art that the light source used to reconstruct the hologram is the light source used to record it. One skilled in the art can certainly use different type of light source as desired for computer calculating the hologram that suitable for different type of light source illumination.

With regard to claims 35-40, 43-45, and 61-64, Cameron et al teaches that the spatial light modulator is used to display the computer generated hologram this means the spatial light modulator can control the phase and the amplitude. This reference does not teach explicitly of reproducing color hologram. However a standard spatial light modulator can display color image with three primary color sub-pixels as one single pixel. It would have been obvious to one skilled in the art to make the display a color holographic display. This reference also does not teach that the spatial light modulator is a TFT flat screen. But since TFT flat screen is one known type of spatial light modulator such modification would have been obvious to one skilled in the art to use commercial available modulator for the display.

Art Unit: 2872

With regard to the features of intended uses of the display as gaming device, medical image display device or military information display device, such modifications are considered obvious to one skilled in the art for the benefit of achieving the desired the application functions.

Double Patenting

3. The nonstatutory double patenting rejection is based on a judicially created doctrine grounded in public policy (a policy reflected in the statute) so as to prevent the unjustified or improper timewise extension of the “right to exclude” granted by a patent and to prevent possible harassment by multiple assignees. A nonstatutory obviousness-type double patenting rejection is appropriate where the conflicting claims are not identical, but at least one examined application claim is not patentably distinct from the reference claim(s) because the examined application claim is either anticipated by, or would have been obvious over, the reference claim(s). See, e.g., *In re Berg*, 140 F.3d 1428, 46 USPQ2d 1226 (Fed. Cir. 1998); *In re Goodman*, 11 F.3d 1046, 29 USPQ2d 2010 (Fed. Cir. 1993); *In re Longi*, 759 F.2d 887, 225 USPQ 645 (Fed. Cir. 1985); *In re Van Ornum*, 686 F.2d 937, 214 USPQ 761 (CCPA 1982); *In re Vogel*, 422 F.2d 438, 164 USPQ 619 (CCPA 1970); and *In re Thorington*, 418 F.2d 528, 163 USPQ 644 (CCPA 1969).

A timely filed terminal disclaimer in compliance with 37 CFR 1.321(c) or 1.321(d) may be used to overcome an actual or provisional rejection based on a nonstatutory double patenting ground provided the conflicting application or patent either is shown to be commonly owned with this application, or claims an invention made as a result of activities undertaken within the scope of a joint research agreement.

Effective January 1, 1994, a registered attorney or agent of record may sign a terminal disclaimer. A terminal disclaimer signed by the assignee must fully comply with 37 CFR 3.73(b).

4. **Claims 11-16, 18-23, 25-26, 28-29, 31-48, 51-54, 56-57, 59 and 61-64** are provisionally rejected on the ground of nonstatutory obviousness-type double patenting as being unpatentable over claims 1-22 of copending Application No. **11/427,629**. Although the conflicting claims are not identical, they are not patentably distinct from each other because they both claim reconstructing three-dimensional scene using light source and hologram encoded in hologram bearing medium with the hologram be Fourier transformed.

This is a provisional obviousness-type double patenting rejection because the conflicting claims have not in fact been patented.

Art Unit: 2872

5. **Claims 11-16, 18-23, 25-26, 28-29, 31-48, 51-54, 56-57, 59 and 61-64 are provisionally rejected** on the ground of nonstatutory obviousness-type double patenting as being unpatentable over claims 1-21 of **copending Application No. 11/313,989**. Although the conflicting claims are not identical, they are not patentably distinct from each other because they both claimed hologram that is reconstructed. In various dependent claims they both claimed the same method for encoding into a region of the hologram information solely for a single point of the three dimensional scene.

This is a provisional obviousness-type double patenting rejection because the conflicting claims have not in fact been patented.

6. **Claims 11-16, 18-23, 25-26, 28-29, 31-48, 51-54, 56-57, 59 and 61-64 are rejected** on the ground of nonstatutory obviousness-type double patenting as being unpatentable over claims 1-19 of **U.S. Patent No. 7,315,408**. Although the conflicting claims are not identical, they are not patentably distinct from each other because they both claim display device for reconstructing hologram. The identical specifics concerning the hologram are explicitly stated in the various dependent claims of both applications.

7. **Claims 11-16, 18-23, 25-26, 28-29, 31-48, 51-54, 56-57, 59 and 61-64 are provisionally rejected** on the ground of nonstatutory obviousness-type double patenting as being unpatentable over claims 1-24 of **copending Application No. 11/427,645**. Although the conflicting claims are not identical, they are not patentably distinct from each other because they both claim hologram that can be reconstructed to generate three dimensional object scene. The identical specifics are claimed in the various dependent claims of both applications. .

Art Unit: 2872

This is a provisional obviousness-type double patenting rejection because the conflicting claims have not in fact been patented.

8. Claims 11-16, 18-23, 25, 25, 28, 29, 31-48, 51-54, 56, 57 and 61-64 are provisionally rejected on the ground of nonstatutory obviousness-type double patenting as being unpatentable over claims 1-26 of copending Application No. 11/427,644. Although the conflicting claims are not identical, they are not patentably distinct from each other because they are not patentably distinct from each other since they both claim hologram for reconstructing three dimensional scene with the same arrangement and specifics .

This is a provisional obviousness-type double patenting rejection because the conflicting claims have not in fact been patented.

9. **Claims 11-16, 18-23, 25-26, 28-29, 31-48, 51-54, 56-57, 59 and 61-64** are provisionally rejected on the ground of nonstatutory obviousness-type double patenting as being unpatentable over claims 1-19 of copending Application No. **11/937,991**. Although the conflicting claims are not identical, they are not patentably distinct from each other because they both claim display device for reproducing hologram. .

This is a provisional obviousness-type double patenting rejection because the conflicting claims have not in fact been patented.

Allowable Subject Matter

10. The following is a statement of reasons for the indication of allowable subject matter: of the prior art reference considered none has disclosed a method and device for reconstructing three dimensional scene using reconstruction device, (with details set forth in claims 11 and 41), includes *a light source*, an *optical system* and a *hologram encoded* on a hologram bearing medium wherein the optical system

Art Unit: 2872

images the light source to *an image plane* of the light source and a viewing window is provided at the image plane and the three dimensional scene is reconstructed from the hologram encoded in the hologram bearing medium *within* a reconstruction frustum stretch between the hologram bearing medium and the viewing window.

Response to Arguments

11. Applicant's arguments with respect to *amended* claims 11 and 41, have been considered but are moot in view of the new ground(s) of rejection.

12. The applicant is respectfully noted as the cited references shown, it is possible to form the viewing window at the image plane of the light source. Since the **claims no longer require, due to the amendment**, the hologram to be formed between the optical system and the focal plane of the optical system, Figure 1 of cited Cameron reference in combination with the newly recited Klug reference disclose that it is possible to provide the viewing window at the focal plane of the optical system which is the image plane of the light source when the light source is imaged by the optical system to the focal plane.

Conclusion

13. Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of

Art Unit: 2872

the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Audrey Y. Chang whose telephone number is 571-272-2309. The examiner can normally be reached on Monday-Friday (9:00-4:30), alternative Mondays off.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Stephone B. Allen can be reached on 571-272-2434. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

Audrey Y. Chang, Ph.D.
/Audrey Y. Chang/
Primary Examiner, Art Unit 2872